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National Aerospace Laboratory NLR

AMS Tracker Thermal Control Subsystem

Thermal Switch Integration Procedure Condensers

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Contents

14

14

END OF DOCUMENT 16

(16 pages in total)

1 Scope of the integration procedure

The procedure in this document describes the gluing of component thermal switches to the TTCS condensers.

2 Equipment list

Clean room ,class 100000 (min)
Vacuum Chamber (BLUE M , BINDER or equivalent function)

3 List of to be documented values

For these integration procedures it is important the following parameters/values are listed:

1. The expiry dates of adhesive shall be written in the procedure sheet of Section 6.2
2. The work life of the mixed adhesive is 90 minutes.
3. Mixing Rate :
   Weight ration Part A (gray): Part B (off-white)= 7 : 5
   or Volume ration Part A (gray): Part B (off-white)= 3 : 2
4. The curing time / temperature of glue shall follow the table in the item 6 of Section 4
5. List series number, type and mass of integrated TS's
6. List Pt1000 numbers and type

4 Gluing Integration Procedure in main steps

The main integration procedure steps are:

1. Cleaning
   (a) Use the IPA solvent to clean the area where (both surfaces to be jointed) the thermal switch and sensor will be glued , in order to remove all dust, dirt, grease, rust, etc .
   (b) The size of area to be cleaned shall be larger than the size of area to be glued
   (c) Visually check the cleaned area is clean after waiting the area is dry. Don't touch the cleaned area.
   (d) If the cleaned area isn't clean, repeat the steps (a) ~ (c).

   If the cleaned area isn't still clean after repeating three times, contact the engineers.

2. Adhesive checking

   The adhesive shall be : **3M 2216 Gray , Epoxy adhesive, Part A & Part B**.

   Make sure the adhesive is during the shelf life.

3. Adhesive preparation

   The adhesive is two-part (Part A & Part B). Take the proper weight (or volume) ration of Part A and Part B from the cans .

   Weight ration Part A (gray): Part B (off-white)= 7 : 5

   Or Volume ration Part A (gray): Part B (off-white)= 3 : 2

   Close the cans.

   Mix two parts until uniform color is obtained.

   Keep mixing approximately 15 seconds.

   Put the mixed adhesive in the vacuum chamber to make the bubble out of the mixed adhesive.

   The following steps shall be finished during the work life of the mixed adhesive. The work life is 90 minutes

4. Mixed adhesive application

   Apply the mixed adhesive on the area where (both surfaces to be jointed) the thermal switch and sensor will be glued with the spatula or trowel. Remove the redundant adhesive if/as required.

5. Gluing

   Put thermal switch and sensor on the applied adhesive with contact pressure. Make the sufficient mixed adhesive around and under the thermal switch and sensor. However under

the sensor just sufficient, while the thermal resistance between object and sensor shall be minimized. Note the direction requirement of thermal switch and sensor after gluing .

6. Hardening

Thermal switch and sensor must be kept aligned during cure. Cure time/temperature as the following table :

Product	3M™ Scotch-Weld™ Epoxy Adhesive	
	2216 Gray	
Cure Temperature	Time	
75°F (24°C)	7 days	
150°F (66°C)	120 minutes	
200°F (93°C)	30 minutes	

5 References documents

	Title	Number	Date
RD-1	**Scotch-Weld**™ **Epoxy Adhesive** 2216 B/A Technical Data	None	August,2005
RD-2	**Condenser Assembly drawing Primary Wake & Secondary RAM**	ET5998-09-DR-001-C-KW-CONDENSOR ASSEMBLY	20 March 2009
RD-3	**Condenser Assembly drawing Primary Wake & Secondary RAM**	ET5998-10-DR-001-B-KW-CONDENSOR ASSEMBLY	20 March 2009

6 Gluing integration procedure

6.1 Switch and sensor gluing integration procedure sheets

The Switch and sensor integration procedure sheets shall be filled in, and shall accompany the condenser during it's lifetime in order to be able to show the procedure was followed.
The switches are as the following :

Item	Name	Manufacturer & Type
1	Thermostats (Thermal Switch)	Honeywell TS 705 series Set-point - 25 C closing, -15 C for opening, Part number G311P641/03705S-13A005

6.2 Gluing Integration procedure sheet

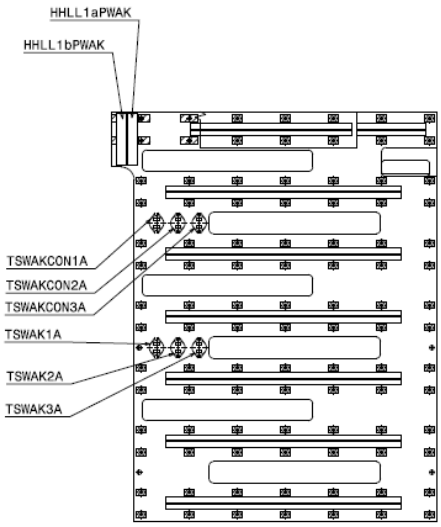
6.2.1 Thermal Switch gluing procedure TTCS CONDENSERS

	Title: Thermal Switch Gluing CONDENSERS	Company: **CGS**	Project engineer:		date:	
	Fill in by hand.	Component:	Quality Assurance engineer:		location:	
	Drawing numbers: **ET5998-09-DR-001-C-KW**	Part number:	Serial no/Lot no:			
	ET5998-19-DR-001-B-KW				Verification	
Step	Operation		Documented Parameters		Tech √	QA √
1.	The adhesive shall be 3M 2216 "**Gray**" (Part A & Part B)					
2.	Adhesive is during the shelf life. Write the expiry date in the right column.					
3.	Sufficiently cleaning with IPA before gluing					
4.	The mixing rate shall be Weight ration Part A (gray): Part B (off-white)= 7 : 5 Or Volume ration Part A (gray): Part B (off-white)= 3 : 2 Write the actual data in the right column					
5.	Mix two adhesive parts until uniform color is obtained.					
6.	Vacuum the mixed adhesive.					
7.	Sufficient mixed adhesive around and under the thermal switch and sensors, not too much under sensor					
8.	All steps shall be finished during the adhesive work life 90 minutes					
9.	The curing time /temperature of glue shall follow the table in the item 6 of Section 4 and write the actual data in the right column					

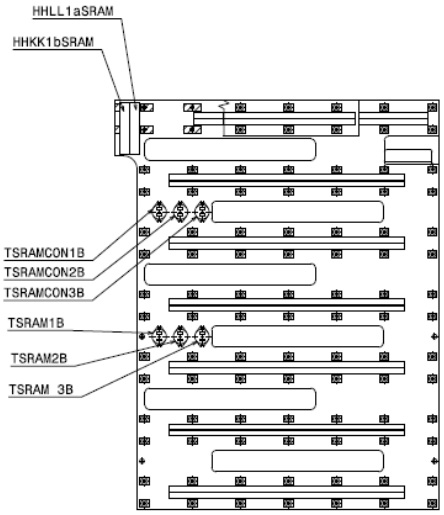
	Title: Thermal Switch Gluing CONDENSERS	Company: **CGS**	Project engineer:		date:	
	Fill in by hand.	Component:	Quality Assurance engineer:		location:	
	Drawing numbers: **ET5998-09-DR-001-C-KW**	Part number:	Serial no/Lot no:			
	ET5998-19-DR-001-B-KW				Verification	
Step	Operation		Documented Parameters		Tech √	QA √
10.	**Use drawing ET5998-09-DR-001-C-KW CONDENSOR ASSEMBLY FOR PRIMARY WAKE**					
11.	Install TSWAKCON1A Honeywell TS705 Part No. G311P651/03705S-13A005					
12.	Install TSWAKCON2A Honeywell TS705 Part No. G311P651/03705S-13A005					
13.	Install TSWAKCON3A Honeywell TS705 Part No. G311P651/03705S-13A005					
14.	Install TSWAK1A Honeywell TS705 Part No. G311P651/03705S-13A005					
15.	Install TSWAK2A Honeywell TS705 Part No. G311P651/03705S-13A005					
16.	Install TSWAK3A Honeywell TS705 Part No. G311P651/03705S-13A005					
17.	Check Cleanliness of glue around TS					
18.	In case lots of spill remove glue					
19.	Take pictures of installed TS					
20.	End of Procedure					

7 Appendix : Glue specification

8 Appendix : drawings and tables



FM1



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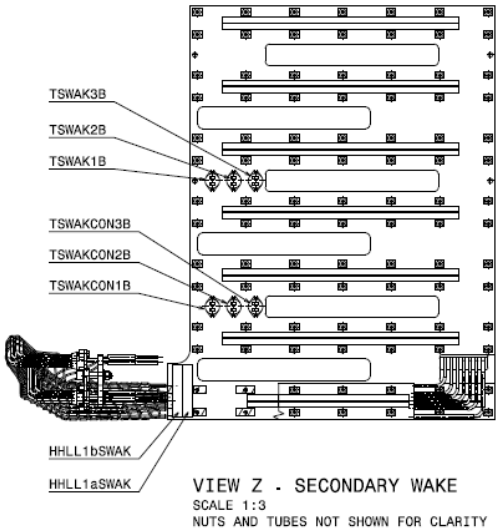

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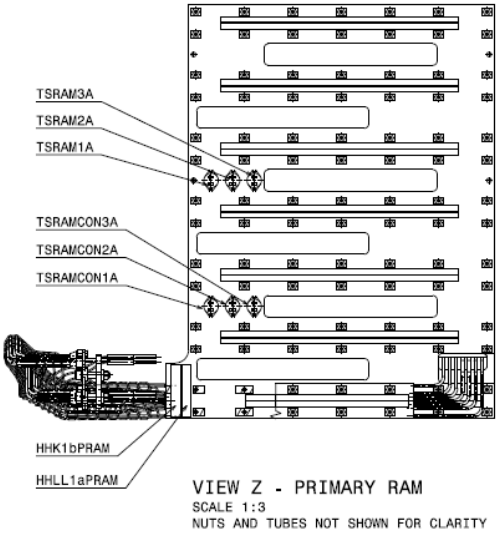

FM4

Condenser	ID Thermostat	P/N
PW (FM1)	TSWAKCON1A	
	TSWAKCON2A	
	TSWAKCON3A	
	TSWAK1A	
	TSWAK2A	
	TSWAK3A	
SR (FM2)	TSRAMCON1B	
	TSRAMCON2B	
	TSRAMCON3B	
	TSRAM1B	
	TSRAM2B	
	TSRAM3B	

Condenser	ID Thermostat	P/N
SW(FM3)	TSWAKCON1B	
	TSWAKCON2B	
	TSWAKCON3B	
	TSWAK1B	
	TSWAK2B	
	TSWAK3B	
PR (FM4)	TSRAMCON1A	
	TSRAMCON2A	
	TSRAMCON3A	
	TSRAM1A	

	TSRAM2A	
	TSRAM3A	

END OF DOCUMENT